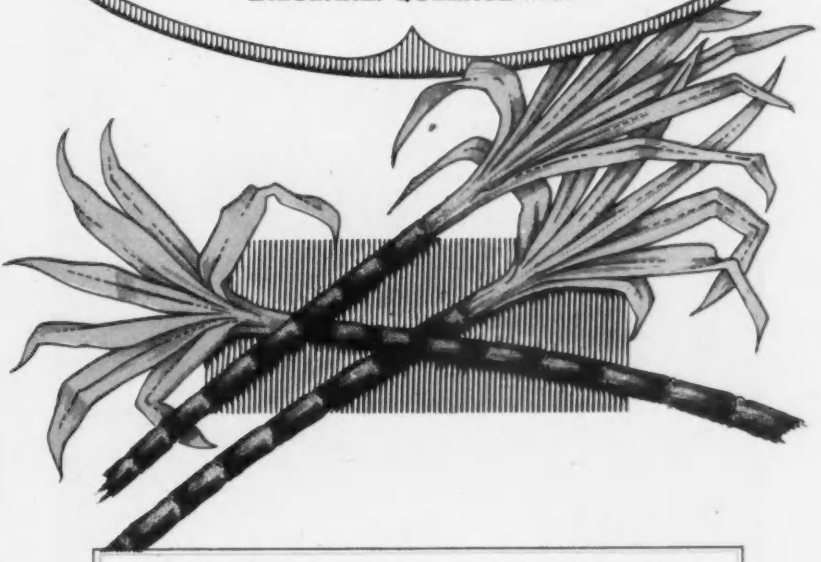
DEPARTMENT OF AGRICULTURE AND STOCK.

The CANE GROWERS' QUARTERLY BULLETIN

ISSUED BY
BUREAU OF SUGAR EXPERIMENT STATIONS
BRISBANE, QUEENSLAND.



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BUREAU OF SUGAR EXPERIMENT STATIONS
BRISBANE

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ISSUED BY DIRECTION OF THE
HON. F. W. BULCOCK, MINISTER
FOR AGRICULTURE AND STOCK

1 OCTOBER, 1934

DAVID WHYTE, GOVERNMENT PRINTER, BRISBANE

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The
Cane Growers' Quarterly
—Bulletin—

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Irrigation Trial at Bundaberg.

By J. PRINGLE.

FOR many years past an irrigation project has been under consideration for the red volcanic lands of the Bundaberg area. These soils are naturally of high fertility but their droughty nature is responsible for generally disappointing crops in any but the most favourable seasons. This was clearly evidenced by the disastrous results of the 1931-32 season when but a small proportion of the cultivated area was fit to harvest, while the average tonnage per acre from those blocks which were cut was less than 7 tons of cane. This experience promptly revived interest in the irrigation project, and a small scale trial was instituted at the Bundaberg Station, with a view to determining the tonnages which might be expected under optimum growing conditions. The area devoted to the trial was necessarily limited by the restricted water supply which could be drawn from the Station well by a small cylinder pump.

Thirteen rows of cane, each a little more than a chain long, were planted in the experimental area. The variety was P.O.J. 2878 which has recently found considerable favour with growers in these parts by reason of its high resistance to gumming disease and drought, its prolific stooling and ratooning ability and its vigorous growth. The setts were planted in deep drills which were employed as irrigation furrows throughout the growth of the crop. The limited amount of weed control which was necessary was effected by hoeing.

The canes were planted on 2nd March, 1933. As the soil was dry at the time, an application of water was given immediately. An excellent germination resulted and no supplies were necessary. In order that the plantfood supply of the soil might not become a factor limiting crop growth, the following mixture was applied in the drill with the setts:—

	lb. Per acre.
Sulphate of ammonia	300
Superphosphate	200
Muriate of potash	400
	900

The following supplementary applications were made at monthly intervals until July 1934:—

	lb. Per acre.
Sulphate of ammonia	100
Superphosphate	20
Muriate of potash	50
	170

The total application of artificial manure throughout the growth of the crop was approximately 1½ tons per acre.

To ensure that the cane should not suffer through lack of soil moisture, irrigation water was applied at the following rates per week:—

	Inches.
Autumn months	2
Winter months	1
Spring months	3
Summer months	4-5

Due allowance was made for rain which fell during the period. It should be stressed that no suggestion is made that the trial was conducted on commercial lines, as the specific purpose of the experiment was to obtain an estimate of the maximum crop yield which might be expected under irrigation on these lands.

The winter months of 1933 were highly favourable for early crop growth, and the canes made excellent progress. The stooling was most satisfactory and by mid-September the crop was making cane. At this stage growth measurements were instituted to determine the rate of cane production. During the hot summer months of November and December the growth rate was most marked and over selected periods it exceeded 7 inches per week. Unseasonably cool conditions prevailed during January, and in early February much of the cane was damaged by a cyclonic blow, the full force of which was felt at the Station. Some of the stools were completely uprooted while the tops were blown off a large number of sticks. The cane made slow recovery after this experience, and the continued cool weather did not assist in the promotion of renewed vigorous growth. The best growth from February until the winter months was actually recorded in April.

The crop was harvested early in September, 1934, when the cane was eighteen months old. The yield from the plot (area, 0.0893 acre) was 8.337 tons of cane, which is equivalent to a yield of 93.4 tons per acre. The mill c.c.s. value was 12.1 per cent.; though this was doubtless influenced by the high proportion of fallen cane, the yield of c.c.s. per acre was 11.3 tons. The accompanying graph (Fig. 6) demonstrates the rate of crop production month by month, and shows very definitely that the long, warm, sunny days of early summer provide the most favourable conditions for cane growth, provided the soil moisture is adequate; when natural rainfall during this period is deficient, as is so generally the case in the Bundaberg area, the loss in potential crop is of vital importance to the farmer. In spite of the prolific growth which was recorded in this small trial, and the large proportion of fallen cane which was harvested, the c.c.s. was quite satisfactory, and suggests

that early planting enables the cane to attain a well advanced state of maturity by reason of its "age." A set of interesting data bearing on this point has been collected during the present harvesting season and will be presented at an early date.

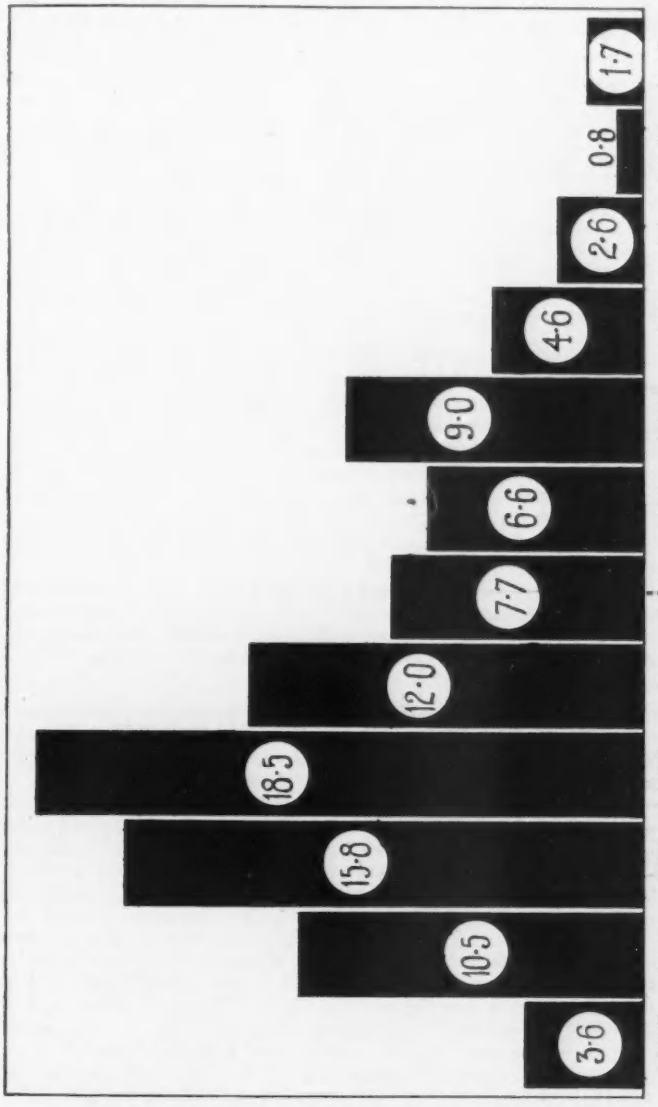

Fig. 6.

The blocks represent by their height the relative monthly cane production, while the figures give the actual cane tonnage produced in each month.

It must, therefore, be concluded that, given an adequate water and plant-food supply, the red volcanic loams of this area are capable of producing heavy tonnages of cane per acre; the experiment will be continued through the first ratoon crop, and further interesting figures may be expected a year hence.

Intensive Cane Cultivation and Costs of Production.

By H. W. Kerr.

THE 1933 raw sugar crop of 638,000 tons created an all-time record for Queensland. The average value of this sugar was £16 3s. 6d. per ton; which is the lowest price the industry has received since 1914. On the preliminary estimates for the 1934 harvest it is anticipated that 636,000 tons of sugar will be manufactured—just 2,000 tons less than the 1933 record. It is, therefore, certain that the canegrower will again be faced with a low value for his crop, due to the poor price which will be realised for sugar marketed overseas. World market values for the commodity show little sign of improvement, due to the excess of carry-over stocks from previous years, and although world production has been reduced since 1929, the situation has been aggravated by a greater reduction in consumption.

For the Queensland producer the position is, therefore, far from reassuring. Though a favoured few may be able to grow cane profitably with sugar at its present value, there are many growers to whom a continuance of low returns must end disastrously; and any relief from the present position must come as a result of the grower's own efforts to reduce still further his costs of production. This is a topic which doubtless offers little appeal to the farmer. For the past ten years he has been forced to curtail expenses to keep his finances within the bounds of his diminishing income. In many cases a reduction in costs could be effected only by increasing production, and thus further burdening an already over-supplied market with surplus sugar, to be exported at a loss. Doubtless many of the present ills of the industry are attributable to this cause, and the grower is now obliged to concentrate on methods which will enable him to cut costs without added crop production. It is proposed in this brief discussion to indicate the means whereby this end may be achieved.

On analysis, it is found that the chief item in production costs is that of labour; in general, this item constitutes 75 per cent. of the gross costs, and increased production efficiency must, therefore, be concerned very largely with increased labour efficiency. It should be clearly understood what is meant by this statement. It implies no suggestion of increased hours or reduced wages for farm hands, though growers are entitled to their own views in this regard. It is concerned entirely with those considerations which will enable the grower to show an increased crop production per unit of labour employed in farm operations; and in this discussion, the situation will be dealt with under existing labour conditions.

In those countries where an abundance of cheap labour is available for sugar production, the efficiency of labour is not a very serious item, and in general it can be set at a low figure; but, where Australian standards of living are enjoyed, the standards of efficiency must be raised in proportion, if these privileges are to continue; in other words, high standards of living and low standards of efficiency are incompatibles. It is also fully appreciated by the farmer that there is a limit to the acreage which one man is competent to take care of; and therefore, reduction in labour costs per ton of cane can be achieved only by the adoption of intensive cultivation methods. It is my opinion that a canegrower cannot produce his crops economically, with current market values, unless his production per man year is equal to 400 tons on

an unirrigated farm, or 500 tons where irrigation is practised. Such considerations as costs of fertilizer, implements, irrigation water, are of rather minor importance in this regard; unless the farmer is able to reduce his *labour* costs to a figure in the proximity of what has been indicated, his production becomes uneconomical; and the incidental costs of fertilizer, water, and so on, must be regarded as essential aids in achieving this purpose—not as burdensome expenses which increase the cost of production, and which must be eliminated when crop values contract.

Many growers are so placed that the adoption of this plan is well-nigh incapable of realisation. Where so-called marginal lands are being cultivated, the combination of growing conditions customarily experienced does not permit intensive methods, nor do crop returns enable the grower to pursue a method of soil-building which would ultimately raise the production level to an economic figure. There are, however, many of the older lands of the sugar belt which were originally highly productive, but which were depleted of their fertility in the early days before the true value of fertilizers as essentials to successful cropping were appreciated. The adoption of improved farming methods on these lands would definitely lead to increased yields per acre, with a consequent improvement in labour efficiency.

There are also large tracts of fertile land whose productivity is limited almost entirely by soil moisture deficiency. Such, for example, is the red volcanic soil area of the Bundaberg district on which heavy tonnages are produced in a year of favourable rainfall, but which under average climatic conditions are severely handicapped due to excessive dry spells. These soils are practically identical with the best intensively-farmed lands of the Hawaiian Islands; but irrigation is essential before they can be relied upon to produce those crops which their natural fertility promises. The lands of the Burdekin delta are composed in the main of rich soils of alluvial origin; and fortunately, an abundance of excellent irrigation water is available in the gravel beds of the substrata. The rainfall of the area is altogether too low to assure a satisfactory crop, but the artificial application of water results in the heavy yields which have earned distinction for the district as being the premier cane-producing area of Queensland. With modern methods of irrigation, and attention to the increased need for fertilizer where large crops are being harvested, it has been demonstrated conclusively that the cost of irrigation water and its application does *not* increase production costs; provided water is available at a cost not exceeding £5 per 1,000,000 gallons, it has been shown that a very substantial reduction in total costs per ton of cane may be effected; and I would urge growers in those districts of uncertain rainfall to develop to their fullest extent any irrigation facilities which may exist or could be created. The guarantee of yield from year to year which becomes possible with irrigation practice is a very substantial aid in economic farm planning, and enables the grower to embark on a system of farm improvement which is otherwise associated with a large element of risk.

In the humid areas of the far North where excessive rains are usually the great problem with which the farmer has to contend, particular attention must be paid to the maintenance of soil fertility. Due to the excessive leaching to which they are subjected, the lands in their virgin state do not carry the highly fertile soils which are popularly attributed to these parts; on the contrary, their productivity may be maintained only when due regard is paid to the application of heavy dressings of artificial manures to supplement the low reserves of plant-food which the soil carries. On the acid alluvial soils of the Johnstone River, the results of field trials harvested from our experiment station demonstrate this point most conclusively. On an area which received

annually 12 cwt. per acre of an appropriate mixed fertilizer, the yield of a second ratoon crop was 36 tons of cane per acre. On an adjacent block which received no manure, the corresponding yield was only 18 tons of cane. Of course it will again be argued that the production of these heavy crops is just what the grower should be striving to avoid in these times of over-production, particularly when they are attained only at a considerable outlay for artificial manures; but it must be emphasised that excessive production will result from this course, only where growers fail to reduce their cultivated area in proportion to the increased crop yields per acre.

The following illustration will demonstrate the influence of manuring on production costs, under these conditions:—Let us assume that the average crop production per man year, under a system where little or no fertilizer is employed, is 225 tons; allowing a value for labour of £225, the labour cost per ton of cane is £1. Under the intensive conditions specified, it will be possible to increase the labour efficiency by at least one-third, as our numerous experiments have demonstrated. The man-year production is thus increased to 300 tons of cane, and the labour cost becomes 15s. per ton. Allowance must, of course, be made for the cost of fertilizer required to effect this crop increase, and our figures show that, on an average, an outlay of 2s. 6d. per ton of cane is demanded. The nett effect is, therefore, to reduce this proportion of production costs from £1 to 17s. 6d.; and furthermore, the grower has made a substantial contribution to the maintenance of the fertility of his soil, without which soil exhaustion would rapidly follow. It cannot be too strongly emphasised that it pays better to increase crop yields by fertilizer applications than by an increased outlay in cultivation expenditure. To harvest the same tonnage of cane from a reduced acreage, permits of long fallowing that portion of the farm which is thus thrown out of cultivation, and this process is nature's own remedy for the rejuvenation of old and worn out lands. By careful attention to such excellent practices as green manuring, the farmer may do much to restore to the land a goodly supply of that most important plant-food—nitrogen—at a trifling cost; and his fertilizer bill—for plant crop manures at least—may be proportionately reduced.

The production of heavier and more profitable ratoon crops also enables the grower to conserve and plough under those most valuable residues of the crop, which are so frequently got rid of by burning—the cane trash and tops. This pernicious practice must be strongly deprecated, particularly in times of low cane values. Few farmers realise that the bonfire which they provide is costing them £1 or more per acre in the value of nitrogen alone, which is irretrievably lost in the burning. With the mechanical methods of handling which have been devised in recent times, the trash from all crops—both plant and ratoon—may be conserved at a very low cost. When rolled into alternate rows, as is the customary practice, it acts as a valuable mulch to conserve moisture for the growing crop during rainless periods, and also reduces by one-half the costs of cultivation in the ratoons. Finally, when ploughed under after the last ratoons are harvested, it provides the grower with the only raw material which is at his disposal for the building up of the humus supply of his land.

In this brief discussion it is not possible to enter as fully into the many aspects of this important topic as one might desire, but it is hoped that sufficient has been said to emphasise the actual production costs which must be studied if cheaper crops are to be produced and these costs do not include the money expended on artificial manures, on irrigation water and its application, or in any other channels which allow the grower to consummate a plan of intensive production. Failure to appreciate the significance of these facts must inevitably render both farm and farmer insolvent.

The Value of Molasses as a Fertilizer.

By E. J. Barke.

IN the process of sugar manufacture practically the entire plant-food content of the juice becomes concentrated in the final molasses. The average composition in this respect is—

Nitrogen, 0.9 per cent.;
Phosphoric acid, 0.3 per cent.;
Potash, 3.0 per cent.

Molasses, therefore, possesses a very definite fertilizer value and it is rather surprising that earlier attempts were not made to utilise the surplus of the by-product in this manner. Certainly some twenty-five years ago the material was employed successfully by the late Mr. Wm. Jackson, of North Eton, Mackay district, but it was not until 1922 that the practice was adopted on a large scale, at Bingera Plantation. The results of these experiments were so highly successful, that the application of molasses as a valued manure has become a standard practice on the lands of this company.

In addition to its manurial value, the sugars and other organic materials of the molasses provide a readily available source of food for the microbes of the soil, and in their decomposition certain highly favourable changes are effected which result in a pronounced improvement in the physical condition of the land. The definite influence on the tilth of the soil is similar to that effected by a heavy green manure crop. While the decomposition process is in progress, the conditions in the soil are not conducive to crop growth; but when the rotting is completed—usually in from eight to ten weeks—the nitrogen becomes available in the form of nitrates, and growing conditions are entirely favourable. It is, therefore, considered desirable to apply the molasses—usually at the rate of from 5 to 10 tons per acre—while the land is in fallow, though at Bingera Plantation molasses has been applied to ratoon fields immediately the crop has been harvested, with very satisfactory results.

From the plant-food composition of the material, one would expect that best results would follow an application of molasses on soil deficient in potash. That this is so was demonstrated in 1931 and 1932 in the results of a trial harvested on the Bundaberg Experiment Station, where the red volcanic soil gives consistently good results from applications of potash-rich manures. Over the plant and first ratoon crops the increase in cane yield due to an application of 10 tons of molasses per acre was almost 30 tons of cane, or 3 tons of cane per ton of molasses applied. An attempt was then made to determine whether molasses would produce corresponding results on potash-rich lands, and parallel trials were conducted at the Mackay and South Johnstone Stations. As a point of interest a further treatment was included, in which plots were given an application of artificial manure supplying amounts of the three plant-foods identical with that applied in the molasses. On the basis of the molasses employed at South Johnstone, for example, the required fertilizer per acre became—

	lb.
Sulphate of ammonia	1,010
Superphosphate	165
Sulphate of potash	860
Total	2,035

This was applied broadcast to the "fertilizer" plots, at the same time as the by-product was spread on the "molasses" plots. The yields recorded at South Johnstone were as follows:—

—	Plant Crop.		First Ratoon Crop.		Second Ratoon Crop.	
	Cane per Acre.	C. C. S.	Cane per Acre.	C. C. S.	Cane per Acre.	C. C. S.
	Tons.	Per Cent.	Tons.	Per Cent.	Tons.	Per Cent.
No Treatment ..	28·4	16·0	30·2	15·6	15·5	15·8
Molasses	41·3	15·3	41·2	15·3	21·0	15·6
Fertilizer ..	38·3	15·6	42·7	15·3	19·5	15·6

It is evident that the molasses treatment was highly beneficial, even on this potash-rich land. Over the three crops the influence of the initial treatment was most marked, and the total increase in yield was 29.4 tons of cane, or 2.94 tons of cane per ton of molasses applied. It is interesting to note that the increased yield due to the equivalent of fertilizer was 26.4 tons of cane, suggesting that the molasses was slightly superior.

The trial conducted at the Mackay Experiment Station yielded similar results, though the crop increases were not so marked. A rather poor block on this station was uniformly treated with molasses at the rate of 10 tons per acre during the past season, and the young cane planted in April of this year is displaying phenomenal early growth.

For those farmers who are able to secure molasses at a nominal figure, and where the haulage distance from the mill is not excessive, the mechanical distribution of this by-product by modern methods enables it to be spread at a cost of 3s. or 4s. per ton. As the gross fertilizer value of molasses is approximately 30s. per ton, growers are urged to consider carefully this excellent method of rapid fertility building of the soil.

Outbreak of Gumming Disease in the Farleigh Area.

An outbreak of gumming disease is at present being investigated in the Farleigh area. The disease has been found on five farms and in each case the variety affected is P.O.J. 2714. This variety is quite susceptible to gumming disease, and its propagation may have to be discontinued in the affected areas.

Sugar at the Royal National Show.

THE sugar organisations were responsible for the production of a sugar display at the Brisbane Exhibition, which was in keeping with the importance of the industry to this State. For the benefit of those who were not able to see the Court, the accompanying illustrations should provide a good picture of the appearance and details of the display.

To describe the layout, we can do no better than reproduce two of the prize winning essays which were presented by school children, in the competition conducted in conjunction with the exhibit. The subject was—

> "The Australian Sugar Industry Exhibit at the Royal National Exhibition, and the Significance of the Sugar Industry to Australia."

I.

"One of the most interesting, instructive, and impressive displays at the Brisbane Exhibition of 1934 was that which represented the sugar industry of Queensland. It took the form of a large model which showed almost every phase of the production of sugar, from the ploughing of the soil to the marketing of the white crystals.

"The landscape consisted of a rich alluvial plain with a range of foothills for a background. The greater part of the plain was in various stages of preparation; part was in course of being ploughed, part had been ploughed, and part had been planted. The untouched land was no doubt intended to suggest that sugar-growing had not yet reached the limit of expansion. The locality of the industry was ingeniously indicated by means of a river, possibly meant to recall the Herbert River district, and also served to draw attention to the set of manufacturing processes through which the raw cane passes.

"The cane is transferred from the delivery trucks on to a mechanical carrier, which transports it to a device called a shredder. Having been sliced and bruised it is passed through a series of heavy rollers which express the juice. By the time it has left the fourth mill where it is subjected to a final pressing, only 4 or 5 per cent. of the sugar is left unextracted from the cane. The cane thus treated, called bagasse, is utilised as fuel to operate the machinery. The juice extracted being still impure is boiled and clarified and eventually, after passing through a series of evaporators, it is transformed to sugar crystals. The final stage of the factory treatment in Queensland is the separation of the raw sugar from the molasses, which is accomplished by means of a centrifugal, a gauze basket revolving at a high speed. In this form the sugar is sent to various refineries in the South.

"The importance of the sugar industry to Australia can hardly be overestimated. It was one of the factors that induced Queensland to join the federation. In return for the Australian market, the sugar industry has made the policy of a White Australia possible. It has proved that the white man can live and flourish in the tropical north, performing work which, until about thirty years ago, was performed only by black labour. The expansion of the industry has done much to make our system of defence against foreign aggressors more secure. Besides this, it has not only helped to develop the North but also contributed to keep the wheels of industry turning in the South. Vast sums of money, amounting to £10,000,000, have been invested in mills

and equipment, and other large amounts have been spent in the construction of roads, railways, and wharves. The annual production of raw sugar during recent years has been in excess of 500,000 tons.

Fig. 7.—These Stools of Standard Cane Varieties, grown by Mr. P. F. King, at Home Hill, attracted keen interest at the Brisbane Show.

"We frequently hear complaints from the Southern States that the sugar industry of Queensland is favoured, at the expense of the rest of Australia. That these complaints are unjustified is proved by trade statistics. Queensland exports to other States goods to the value of £9,000,000 (of which two-thirds consist of sugar) but imports from the other States, goods to the value of £12,000,000. People living in the southern capitals are inclined to forget that their manufacturers also have a sheltered market at the expense of the rest of Australia. Every true Australian should earnestly desire the continued success and prosperity of this great national industry, the sugar industry of Queensland."

Fig. 8.—The Sugar Bay in the Agricultural Court.

A general view of the exhibit arranged by the Bureau of Sugar Experiment Stations in conjunction with the Sugar Organisations.

Fig. 9.—An Impressive Panel of the Sugar Exhibit.

In the foreground is a model refinery on a river frontage with wharf stacked with sugar bagged for shipment. A diorama forms the background on which is depicted the spires, domes, and factory chimneys of a great city, to the wealth of which the sugar industry is an important contributor. The panel is also suggestive of the interlocked relationship of rural and urban enterprise.

II.

"As in most other enterprises, the sugar industry in Australia needs advertising to become known to the public. What better advertisement could there be than a stand in the Industrial Hall at the Royal National Exhibition!

Fig. 10.—The Central Trophy in the Sugar Exhibit.
Beneath the well known quotation of Disraeli are set out a pound of sugar together with the equivalent amounts of staple articles of diet required to furnish the same food value.

"Visitors to the Exhibition could not pass by this attractive exhibit. Models always have an appeal and the tiny representation of the various stages in the production of those beautiful white crystals from the tall waving sugar plant was truly a masterpiece in the art of model-construction.

"First, there was illustrated the ploughing and the planting of the cuttings of cane and the gradual growth to maturity; next the cutting of the crop by hardy canecutters so expert with the curiously shaped knives which they vigorously wield to cut and gather the cane in readiness for transport to the mill. Then the crushing and the many processes of refining were

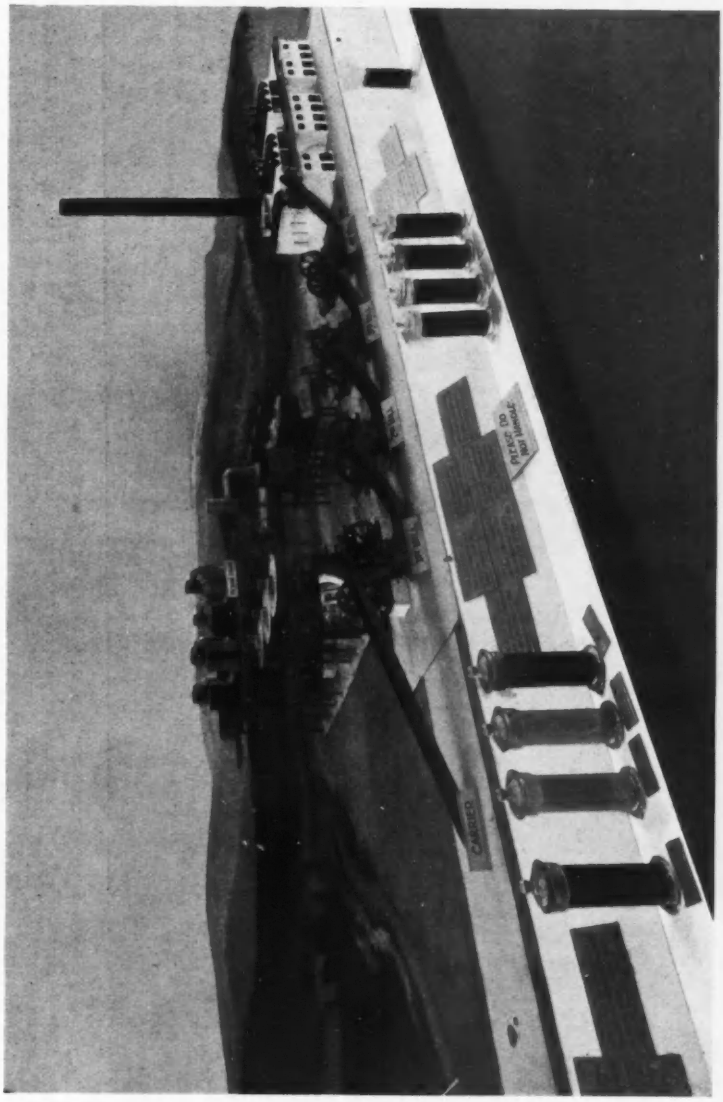

Fig. 11.—A Working Model of a Queensland Sugar Mill.

This model, constructed to scale and showing every factory operation in miniature, was the centre of keen public interest throughout Show Week. In this and adjoining sections the whole story of sugar was illustrated, beginning with the standing jungle and passing through every phase of farming, to milling and finally to the refinery and bagged and stacked sugar for shipment at the waterside.

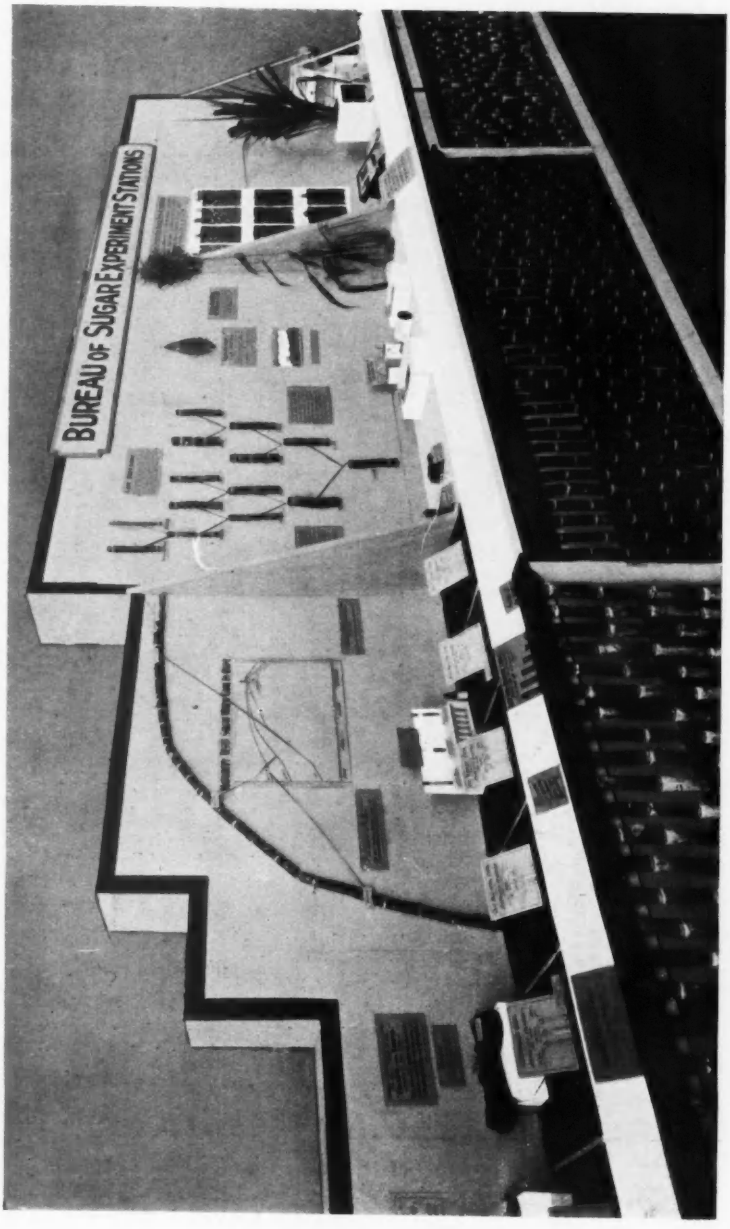

Fig. 12.—The Display illustrating the Work of the Bureau of Sugar Experiment Stations.
This display covered certain phases of soil survey and fertilizer application, maturity testing, cane breeding, the life history and control of the Northern cane grub, and Fiji disease and its mode of transmission.

depicted. It would be almost impossible to construct a comprehensive model to illustrate the benefit derived by Australians and Australian industries from sugar and its many by-products. In another part of the stand models of insects of fearsome appearance were shown. Combating these pests is a very important factor in the continued development of the sugar-growing industry. Research officers are almost continuously at work overcoming the ravages of these enemies.

"The Commonwealth Government realised the importance of the sugar-cane industry, and, because Queensland asked for protection for the industry, assisted its development by according the monopoly of the Australian market with sugar sold at a fixed price.

"Kanaka labour originally employed has long been abolished, experimental farms and central mills have been established and now this great industry supports thousand of workers, and many millions of money are invested in it.'

Outbreak of Gumming Disease in the Mulgrave Area.

An outbreak of the serious gumming disease has very recently been found in the Aloomba section of the Mulgrave area. The chief variety affected is the seedling S.J. 4 which in disease resistance trials has been proved to be the most susceptible variety in Queensland as far as this disease is concerned. Owing to the increasing popularity of S.J. 4 in the far-northern areas this outbreak is particularly unfortunate and serious. Officers of the Bureau are at present actively engaged in investigating the extent of the outbreak with a view to taking suitable precautions.

Varietal Trials in North Queensland.

By G. Bates.

During the present crushing season five varietal trials have been harvested in the Cairns-Babinda areas. The canes under comparison in these experiments were—S.J. 4, S.C. 12/4, P.O.J. 2878, and P.O.J. 2940, against the standard varieties D. 1135, Clark's Seedling, and Badila. The following are brief notes on the origin and history of the new canes:—

S.J. 4.—This cane was bred at the South Johnstone Experiment Station in 1921. It was produced from fuzz collected from Badila arrows, but as this seed was the result of uncontrolled field pollination, the male parent is unknown. In its earlier trials, the variety showed promise on account of its high tonnage yield, but as its c.c.s. value was about a unit below that of Badila, the cane was not favoured for first class lands.

In 1929 it was placed in farm trial plots, when a high percentage of death from leaf scald disease was recorded in the abnormally dry spring season. For this reason the variety was promptly placed on the disapproved list, but subsequent observation showed that the cane is reasonably resistant to this disease, though it is highly intolerant should leaf scald be contracted. The early trouble lay chiefly in the fact that the original stocks from South Johnstone were diseased, but the infected stools died out early under adverse growing conditions. Those canes which survived proved to be almost entirely healthy and have persisted in the Hambledon-Mulgrave areas practically free from leaf scald infection.

Despite its moderate c.c.s. content, the cane is a valuable one, as it is a good striker, good stooler, vigorous grower, and strong ratooner. It tolerates wet conditions remarkably well, and observation shows that it withstands moderate grub attacks much better than either D. 1135 or Clark's Seedling in the Northern soils. The variety has been planted extensively in the Hambledon and Mulgrave areas during recent years on lands subject to grub infestation. The cane is rather a late maturer, which is a disadvantage, and growers should keep this fact in mind. For preference, it should be planted early where possible. As it is most susceptible to gumming disease, the growth of the variety in the southern cane areas is entirely out of the question, for the present.

S.C 12/4.—This is one of the leading varieties of the West Indies, where it is a heavy cropper. Since it was introduced to Queensland some eight years ago it has never shown promising results, and it is retained at the present time by virtue of its favourable breeding qualities. It is susceptible to certain of our major diseases, and the chief point in its favour under Queensland conditions is its reputed high sugar content.

P.O.J. 2878.—This variety—the Java "Wonder Cane"—was introduced by the Bureau in 1928. Due to its reputation, it was much sought after by canegrowers throughout Queensland. In the southern areas it promises to become a valuable standard variety, due to its vigorous growth, resistance to drought and gumming disease, and favourable ratooning qualities. Its high susceptibility to downy mildew disease has resulted in its exclusion from the Burdekin area, while in the far North it produces, as a rule, a stalk of miserable barrel, and in ratoons it degenerates to an unthrifty-reed-like growth. It is rather susceptible, also, to the most serious diseases in these parts—chlorotic streak and red stripe (top rot).

P.O.J. 2940.—This variety was also introduced from Java in 1928. It is a full-sister to the Wonder Cane, though it differs considerably from its famous relation in habit of growth, and in Queensland it gives a higher c.c.s. content. As is pointed out below, however, its growth characteristics are not entirely favourable, and this is particularly true with reference to stooling. Although it produces long sticks the number per stool is small, and they appear to be light in weight. It is highly susceptible to red stripe (top rot), and as far as downy mildew disease is concerned it is the most susceptible variety with which we have had experience.

Trial Results.

The abovenamed canes were set out in five varietal trials on the second class soils of the North, in order to determine their value in comparison with the older varieties usually grown under these conditions. It should be stressed that none of these canes was considered as a rival to Badila under favourable conditions; where the latter entered as the standard of comparison against P.O.J. 2940, growing conditions were not such as favour the North Queensland major variety.

The following are the yield results of the individual trials:—

Mr. J. Mann's Farm, Edmonton.

Age of crop, 11 months.

Yields per acre:—

	Tons.
S.C. 12/4	18.4
P.O.J. 2940	20.5
P.O.J. 2878	25.2
S.J. 4	**30.6**

S.J. 4, therefore, outyielded the remaining varieties by several tons per acre. The poor yields from S.C. 12/4 and P.O.J. 2940 were due in a measure to the poor strikes recorded in these plots, while S.C. 12/4 was definitely checked by chlorotic streak disease. It must be concluded that S.J. 4 is the superior cane under these conditions. Unfortunately, the c.c.s. returns were not recorded, so that the comparative results are incomplete. But it is very doubtful if the variation would be such as to invalidate the above conclusion.

Mr. N. Eardley's Farm, White Rock.

Age of crop, 11 months.

Yields per acre:—

	Tons cane.	C.C.S. in cane. Per cent.
Clark's Seedling	**22.2**	... **16.9**
S.J. 4	24.9	... 16.9

On this block S.J. 4 outyielded Clark's Seedling by 2.7 tons of cane per acre. The latter was a full unit higher in c.c.s., which stresses the necessity for confining S.J. 4 to those lands devoted to poor quality canes, except where grub-resistance qualities are necessary. This crop was slightly damaged by this pest, and S.J. 4 exhibited superior resistance to injury from this cause.

Messrs. Hussy and Co's. Farm, White Rock.

Age of crop, 11 months.

Yields per acre:—

	Tons cane.	C.C.S. in cane. Per cent.
Clark's Seedling	10.8	11.2
S.J. 4	**16.2**	**11.8**

The crop on this area was light, due to the unfavourable conditions experienced. S.J. 4 showed an increase of 5.4 tons of cane per acre over the standard variety, and in this instance was actually higher in c.c.s. content, though the value for both varieties was low.

Messrs. Hickling Bros.' Farm, Aloomba.

Age of crop, 12 months.

Yields per acre:—

	Tons cane.	C.C.S. in cane. Per cent.
D. 1135	21.7	12.7
S.J. 4	**27.3**	**15.1**

S.J. 4 was definitely superior to D. 1135 on this farm. In cane tonnage it outyielded the standard variety by 5.6 tons per acre, while the c.c.s. was greatly in favour of the new variety. In common with so many crops in this area during the past season grub damage was evident; S.J. 4 showed less signs of distress than the standard and this is reflected in the c.c.s. returns.

Mr. T. Cowles' Farm, McDonnell Creek.

Age of crop, 13 months.

Yields per acre:—

	Tons cane.	C.C.S. in cane. Per cent.
P.O.J. 2940	16.4	14.2
Badila	**20.9**	**14.8**

Badila proved superior in both cane tonnage and c.c.s. under these conditions. The strike obtained from P.O.J. 2940 was poor, and the stooling of the crop unsatisfactory.

Commonwealth Fertilizer Subsidy.

Advice has been received that the Commonwealth Government has extended the 15s. per ton rebate payment to primary producers other than wheat growers in respect of all artificial manures applied to the land during the period 1st July, 1934, to 30th June, 1935. The terms and conditions are generally the same as those operating during 1932-33.

The Trapping of Beetle Borers.

By J. H. Buzacott.

WHERE the beetle borer is causing serious damage to sugar-cane, and particularly when conditions do not favour the Tachinid fly parasite, the trapping of the borers has been recommended. The climatic and other conditions of the 1933-34 season have been particularly suitable for the spread of the borer and, on the other hand, have not been favourable for the Tachinid fly. Rat damage, grub attack, and over-mature and otherwise damaged cane all help to increase the extent of borer attack, while wet weather, clinging trash and fallen cane, coupled with continual rain driving ants to the cane stalks for shelter, all combine to reduce the number of Tachinid flies.

Under such conditions the use of trapping as a second line of defence has much to commend it, particularly as a means of protecting a young plant crop when it is situated close to a borer-infested block of standover cane. During the past two months a good deal of work has been carried out to determine how far trapping may be successfully used and the conditions under which it is likely to prove most successful.

From the outset it became evident that many more beetles are trapped during showery weather, indicating that the borers are on the move much more at such times. This characteristic of the borer would account for the fact that the borer is more widespread this year and has done more damage than for many years past.

The type of trap which was found to operate successfully consists of sections of cane stalks, 12 to 15 inches in length, split lengthwise and laid face downwards, criss cross, in three or four layers. The first layer is laid on the soil and each layer consists of four or five pieces of cane. Some of the traps were covered lightly with trash and others were left exposed, but the trash-covered traps collected rather more borers. The experimental traps were placed in the interspaces of a badly infested crop of standover Badila, at a short distance from the headland. The traps were examined at intervals of one to three days and such borers as were found at each inspection were destroyed. It was found, however, that the greatest number of borers were obtained if daily inspections were made.

Experiments were made with traps consisting of cane which had been split for periods ranging from one to forty-three days. Up to thirty days the age of the cane seems to have little influence on the numbers caught, but after thirty days the attractiveness of the split cane falls off very quickly.

Our investigations of this form of control are by no means completed, but two facts have definitely been established. Firstly, trapping yields the best results in showery weather and, secondly, provided the weather is moist the traps may be used for thirty days before it is necessary to renew them.

Although the true value of trapping has yet to be determined by means of extensive borer population counts it is of interest to note that in six traps, exposed from 3rd July to 31st August, 1,455 borers were captured. As an adult female borer lives for ten or twelve months and lays four to eight eggs per day for at least half that period, it is evident that these few traps have been responsible for the destruction of thousands of next season's borers. The greatest catch found in a single trap at any one inspection was fifty-nine borers.

The above trappings were carried out in winter and early spring, but it is probable that better results would be obtained by trapping during the wet season.

Results of Disease Resistance Trials with Sugar Cane Varieties.

By Arthur F. Bell.

With the reconstitution of the Bureau of Sugar Experiment Stations some few years ago, and the formation of a Division of Pathology, a complete survey of the sugar-cane diseases found in this State was carried out. It was apparent from this survey that the distribution of important cane diseases varied greatly from district to district, and that disease control measures would accordingly have to be undertaken on this basis. It also became evident that the most serious disease was the destructive gumming disease, which was found throughout the southern portion of the State, and that this disease should be attacked first. Other diseases of less immediate importance, but for which control measures were obviously necessary, were leaf-scald, downy mildew, red stripe or top rot, Fiji, and mosaic disease.

The Queensland sugar industry, in common with all Australian agricultural industries, is conducted on a small farm basis. Consequently there are not available the personnel, facilities, or capital, which can be drafted into the service of disease control in those countries where agricultural industries are conducted on a vast plantation scale. In view of these circumstances we decided that the main form of attack on sugar-cane diseases in Queensland must be the production of varieties which would be resistant to the chief diseases in each district.

It is a very fortunate circumstance that diseases do not attack all varieties of plants uniformly but that some stand out by virtue of their resistance to each particular disease. It is thus possible to obtain varieties which will resist a disease either by a search for suitable naturally occurring varieties or by the adoption of a programme of plant breeding. Many of the so-called "wild" types of plants possess the excellent quality of very high resistance to plant disease, but, on the other hand, they are not often satisfactory in so far as weight and sugar content are concerned. It is accordingly the job of the plant breeder to combine the hardiness and disease resistance of these plants with the weight and sugar content of others and so produce varieties which are both high-yielding and disease resistant.

In the early days of sugar-cane breeding, attention was focussed on the production of rapidly growing varieties of high sugar content and very little attention was given to the incorporation of disease resistance in such varieties. However, as means of overseas transport grew more rapid, and the interchange of cane plants between the different countries became more frequent, diseases also became more widely distributed. This growing menace is forcing cane breeders to reconsider their methods, and in Queensland powers of resistance to disease are considered of paramount importance in the breeding programme.

For the purpose of providing suitable resistant varieties for the control of the various diseases of cane, and particularly gumming disease, about 400 varieties have been imported into Australia from foreign countries since the inception of this campaign a few years ago. Included in this large collection have been varieties from New Guinea, Hawaii, Java, India, Philippine Islands, United States of America, South America, Porto Rico, and the British West Indies. In addition to extensive importations of varieties from foreign countries, the Bureau of Sugar Experiment Stations also has a comprehensive seedling raising programme, and some 25,000 new varieties are produced in this manner each year. In order to breed canes which will combine most or

all of the features desired in canes in each district of Queensland, we have literally combed the world in order to have all possible types of cane available for crossing. This collection contains varieties from practically every sugar-cane country in the world and includes all manner of types. In order the better to produce seedlings suitable for each of the three main climatic zones of Queensland these seedlings are being raised at three centres—namely, Cairns, Mackay, and Bundaberg.

Gumming Disease.

In this article it is proposed to discuss in detail only the resistance trials which were carried out with gumming disease. As stated earlier, the gumming disease situation in Southern Queensland demanded urgent attention on account of the serious losses being incurred. Furthermore, this disease was so widespread throughout the whole area that a complete change of varieties was essential. In the search for such canes over 1,000 varieties have been tested in carefully planned trials, many having been included in several trials. In addition, officers of the Colonial Sugar Refining Company have tested many hundreds of varieties in New South Wales. All varieties which have given indications of possessing a suitable standard of resistance—confirmed in subsequent trials—have been further planted out in yield and observation trials and a further selection made from aspects other than that of disease resistance. Many have failed to exhibit the necessary qualities in these secondary trials, and have been discarded. The selections from these yield-observation trials are further planted out in yield trials which are set out on farms which are selected so that all soil types are represented.

(In the brief mention of varieties which will follow it will be noticed that the majority are distinguished by a letter, or letters, followed by a number. The possession of such distinguishing letters and numerals denotes that the variety is an artificially produced seedling. The letter or letters indicate the experiment station or institution at which the seedling was raised, while the number is a serial number conferred on promising seedlings in order to preserve their identity. Thus the variety Q. 813 is a seedling raised by the Acclimatisation Society of Queensland, while the seedlings so far raised at our South Johnstone Station are designated by the letters S.J. Similarly the now well-known P.O.J. canes are so designated because they were bred at the Proefstation Oost, Java, or the East Java Experiment Station; varieties whose number is prefixed by the letters Co. obtain this distinguishing mark from the first two letters of Coimbatore, the cane-breeding station in Southern India.)

The first varieties recommended for planting in Southern Queensland as a result of these trials were the Java Wonder Cane, P.O.J. 2878, and the New Guinea canes Korpi and Oramboo—the latter two being suitable for soils of better moisture holding capacity, or for irrigated conditions. The first selections from canes imported specially for the purpose of coping with gumming disease were planted in yield-observation trials in the 1932 season. As a result of these trials, seven varieties were selected and planted out on a number of farm yield trials last season and are now being harvested. These varieties included the Java canes P.O.J. 234, P.O.J. 979, P.O.J. 2379, P.O.J. 2725, and P.O.J. 2875, and the Coimbatore canes Co. 281 and Co. 290. All these canes outyielded the standard variety Q. 813, but the two varieties Co. 290 and P.O.J. 2725 were particularly outstanding. It will be recalled that the 1932 plantings were subjected to very dry unfavourable conditions in Southern Queensland, and, although the standard Q. 813 yielded but 9.3 tons of cane per acre, Co. 290 and P.O.J. 2725 yielded respectively 22.8 tons and 16.8 tons of cane per acre. Furthermore, the preliminary tests

indicated that the sugar content of these two canes compares very favourably with that of Q. 813, while the fibre content is probably lower. These two varieties have ratooned particularly well in this trial and will cut out at some 35-40 tons as compared with a maximum of 20 tons per acre for Q. 813.

In the current field trials Co. 290 was planted in seven farm experiments and in a similar number of propagation plots, and in every instance it has proved to be the highest yielding variety. P.O.J. 2725 has also done remarkably well although it has not fulfilled its promise of early maturity in the southern areas.

The variety ranking third on the list as a result of these trials is a thin cane, P.O.J. 234, which is now being grown to a very considerable extent under the sub-tropical conditions of Louisiana and Argentina. Although out-yielded by both Co. 290 and P.O.J. 2725 it is thought that this variety may have some value on poorer soils, a possibility which is enhanced by the fact that it seems quite definitely to be an early-maturing variety.

In all trials which have been planted these three varieties have consistently outyielded the standard cane, which was been Q. 813, D. 1135, 1900 Seedling, P.O.J. 213, or H.Q. 285, according to locality. All three of them are so highly resistant to gumming disease that they can be planted in the presence of this disease without risk of loss. If the Southern cane fields were entirely planted with varieties of equal resistance, and all odd patches of susceptible canes eliminated, it would be possible to eradicate this dread disease in the space of a very few years. It is purely for such purposes that the recent legislation dealing with approved varieties was introduced. As soon as highly resistant varieties suited to every soil type and every purpose have been made available in sufficient quantity, it is proposed to limit the list of approved varieties to such canes. With the loyal co-operation of all concerned we then hope to bring about the elimination of all odd patches and odd stools of susceptible varieties which would serve to perpetuate the disease. Having achieved this end, and having grown highly resistant varieties only, for a short period, we could be reasonably sure that gumming disease was a thing of the past. The way would then be clear to go back and plant varieties which were particularly outstanding in all respects save only that they were susceptible to gumming disease. A further ten resistant varieties were planted out in an observational yield trial last year, and such trials will be planted each year as suitable canes are released from the gumming disease resistance trials.

With respect to the varieties P.O.J. 2725, P.O.J. 234, and Co. 290, these have been included in trials to test their resistance to other diseases also. In the Southern districts the only other diseases of consequence are mosaic and Fiji diseases, and Southern farmers should note that P.O.J. 234 is quite susceptible to mosaic disease and should not be grown on the river flat and other areas where this disease is prevalent. Co. 290 is moderately susceptible, but P.O.J. 2725 is very resistant, though on the other hand, it is very susceptible to Fiji disease and the greatest care must be taken where this disease exists.

On present indications the latter two varieties possess a high standard of resistance to diseases generally, and it is expected that they will prove of value in districts other than the Southern district. P.O.J. 2725 is distinctly promising in the Mackay and Lower Burdekin districts, particularly in view of its high resistance to downy mildew and top rot diseases. Co. 290 also will be fully tested in the Mackay district and supplies of cane have already been established there for this purpose. On present indications it should prove of value in those sections of poor land where P.O.J. 213 and Uba are at present grown.

Special Fertilizers for Sugar Cane.

By H. W. Kerr.

THE number of individual fertilizer mixtures demanded by the canegrower is much larger than is necessary to provide him with the choice he needs. It is felt that the list could be simplified considerably, and still take care of the precise requirements over a wide range of soil types and climatic conditions. On the basis of the results of farm fertility trials harvested by the Bureau during the past five years, it has been found that only three mixtures are actually necessary for the cane farmer, and a series has been devised for this purpose. They are known as "Sugar Bureau" mixtures, and carry the distinguishing numbers 1, 2, and 3.

In practice, it is desirable to discriminate between suitable mixtures for plant and ratoon cane. This is certainly true where the grower makes it a regular practice to grow and plough under a leguminous cover crop while the land is in fallow. Following this procedure, an appropriate mixture need contain no nitrogen. On the other hand, ratoons almost invariably respond to substantial dressings of nitrogen in the form of sulphate of ammonia. A ratooning mixture should therefore contain a reasonable proportion of nitrogen to provide for the early needs of the young ratoons, while further nitrogen may be supplied by subsequent top dressings of sulphate of ammonia. A "planting" and a "ratooning" mixture has therefore been devised with this essential difference. The six actual mixtures are as follows:—

Sugar Bureau Mixtures.

—	No. 1.		No. 2.		No. 3.	
	Planting.	Ratooning.	Planting.	Ratooning.	Planting.	Ratooning.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Nitrogen as sulphate of ammonia	nil	3·0	nil	3·0	nil	3·0
Nitrogen as bone and offal	1·0	1·25	1·25	1·25	1·75	1·5
Phosphoric acid as water soluble	13·0	9·5	9·0	7·0	2·5	2·0
Phosphoric acid as bone and offal	4·0	3·5	3·75	3·75	7·5	4·5
Potash as muriate ..	7·5	6·25	15·0	12·5	25·0	22·5

The No. 1 mixtures are suitable for lands deficient in phosphates; these include the alluvials and forest soils of most areas. The No. 3 mixtures are particularly suitable for red volcanic soils, and in this respect are more effective than any of the standard mixtures containing lower proportions of potash. The No. 2 mixtures are "balanced" in composition, and are intended for use on those soils which give definite results from both potash and phosphates. They are suitable, for example, on the red schist soils of North Queensland.

It should be pointed out quite definitely that none of these mixtures will supply the entire requirements of the crop insofar as the plantfood nitrogen is concerned. In all cases—for plant and ratoon mixtures—their

use should be supplemented by top dressings of sulphate of ammonia when the plant crop is stooling, or when the ratoon shoots are about a foot high. As was pointed out above, planting mixture is sufficient when green manuring is practised, but all ratoon crops require sulphate of ammonia after a preliminary application of ratooning mixture; from 2 to 4 cwt. of this manure are usually sufficient.

If the grower is in doubt regarding the mixture which is best suited to his conditions, he should get in touch with the local field officer or experiment station chemist, who will be able to advise him; or if a soil sample be forwarded to the head office of the Bureau, it will be analysed free of charge, and advice given on the results of the tests.

"Wet" Farms in the Mackay District.

IN this area there are a number of what are known locally as "wet" farms. This implies that the natural drainage over all or portions of these farms is defective. The usual expedient adopted by growers under these conditions is "bedding-up." The land is ploughed into beds running parallel to the direction of greatest slope of the block, with water furrows between. The number of cane rows in each bed varies from two to fifteen or more, depending on conditions. When this method is pursued with care, a fairly satisfactory job may be effected; the excessive surface water is removed, at least, and the cane crop benefits from the better aeration of the surface soil which is thus promoted. But frequently no provision is made for discharging the water from the courses between the beds, and following heavy rains these may remain excessively wet for long periods.

It is not necessary to stress the need for adequate drainage if satisfactory cane crops are to be harvested; every cane grower is familiar with this fact. But it is not generally appreciated that drainage is the only effective means at the farmer's command for the elimination of wireworms from those blocks where damage from these pests is experienced in young plant cane. Further, these growers must also remember that the provision of adequate drainage just prior to planting does not render the field immune to attack. The studies of our entomologists have shown that the adult of this pest deposits its eggs in the fields during the preceding summer. In the early stages of their growth the young wireworms require exceedingly wet conditions in the field in order to survive, although in later stages (in winter and spring for example) they can withstand quite dry conditions. Their destruction, therefore, may best be brought about by the provision of drainage which will ensure that all surface water gets away rapidly and allows the land to dry out during this early period of the wireworms' life. Consequently, ample drainage provision must be made at the time the old ratoon stubble is ploughed out, and retained throughout the fallow period, if wireworm damage is to be avoided during the ensuing spring planting season.

Good drains are valuable farm assets; and though their installation may be a laborious undertaking, the final result is certainly worthy of the effort. This is reflected in more profitable crops, with greater ease of cultivation; and where the grower is seeking to avoid a faulty strike due to wireworms, preventive methods only are available; there is no practicable cure. Certainly those growers on wet farms should not desire a repetition of the troubles which followed the heavy and moderate wet seasons of 1928-30.

H.W.K.

The Superiority of S.J.4 over Badila in Regard to Beetle Borer Attack.

By R. W. Mungomery.

Note.—The variety S.J.4. is advocated as a substitute for the miscellaneous collection of canes now grown on the poorer lands of the far North. It has never been recommended as a substitute for Badila on the good lands.

IT is often observed that many of the so-called "wild" plants suffer very little from disease or insect attack when compared with closely related cultivated plants. Such plants are spoken of as being "resistant varieties" on account of their having some inherited character which enables them to withstand the attack in question. Plant breeders are often able to breed such characteristics into the cultivated strains and this method of producing disease-resistant varieties is very widely used in the control of plant diseases. The control of insect pests by this means does not hold nearly so much promise, but, nevertheless it is possible to produce plants which are more resistant to insect attack than others on account of their having a hard thick rind, hairy leaves, the power to produce new roots rapidly, and so on.

Particular attention is now being paid to the disease or insect pest resistance of our Queensland seedlings, and recently we reported on the resistance of the seedling S.J.4 to grub attack. During the course of recent investigations concerning the establishment of the Tachinid fly parasite in borer-infested canefields it has been necessary to make accurate counts of the numbers of borers present on certain blocks of cane. Different varieties have been closely examined during the course of this investigation, and we have been struck with the greater resistance of S.J.4 to beetle-borer attack when compared with Badila, the standard cane of North Queensland.

It is a well-known fact that beetle borers are strongly attracted to cane which has been damaged in any way and so has commenced to "sour." This condition of the cane is brought about by a number of agencies which include rat damage, grub damage, injuries caused by flood and cyclone, lodging of the crop, and over-maturity. It is obvious, therefore, that any variety which is better able to withstand the effect of any of these adverse circumstances, is also likely to escape a good deal of the borer injury. The variety S.J.4 when compared with Badila is found to have a harder rind; it has a stronger and more vigorous rooting system and hence is less susceptible to grub attack or lodging, and it is less prone to over-maturity. Consequently, it is not surprising to find that it has considerably greater powers of resistance to borer attack than Badila.

As evidence of this greater resistance we will quote the case of an actual field count made during the investigation. This field contained the varieties S.J.4 and Badila growing side by side under identical conditions, both varieties being eleven months old plant cane. A careful count was made, and it was found that while 23.1 per cent. of the stalks of Badila contained borers, only 4.25 per cent of the stalks of the S.J.4 were so affected.

New Cane Varieties in the Bundaberg Area.

By N. J. King.

IN 1933 a varietal trial embracing a selection of the new gum-resistant canes was harvested on the Bundaberg Experiment Station. As most of these varieties were superior in yielding capacity to the standard variety (Q. 813), the canes were employed in planting further trials on selected farms. In choosing the locations for these experiments, due regard was paid to the soil type, and the class of cane employed as the customary standard. At the time of publishing this number of the "Bulletin" three of the trial blocks have been harvested, and the returns from these are particularly interesting. They are, therefore, presented at this time as a guide to growers who practise February-March planting in these parts.

Each trial consisted of twenty-five small plots, five of each of the five varieties under comparison, and the yields reported below are the average tonnages of the five similar plots.

Trial Results.

Messrs. Gahan Bros.' Farm, Tantitha.

Soil type, alluvial loam.

Age of crop, 11½ months.

Crop yields—

Variety.	Cane per Acre.	*C.C.S. in Cane.
	Tons.	Per Cent.
Q. 813	14·2	15·4
P.O.J. 2878	26·7	14·0
P.O.J. 2875	22·0	14·3
P.O.J. 234	27·8	**15.9**
Co. 290	**37.1**	14·4

* Small mill tests—canes were allocated for further plantings.

On this farm, Co. 290 outyielded all other varieties by a very substantial margin. The increased yield over Q. 813 was almost 23 tons of cane per acre. In c.c.s. value P.O.J 234 gave the highest return, while the results for the remaining canes must be considered as satisfactory, having regard for the heavy tonnages recorded, and the apparently immature condition of the crop when harvested; it was less than twelve months old.

Messrs. C. D. and H. D. Buss' Farm, Oakwood.

Soil type, red sandy forest soil.

Age of crop, 11 months.

Crop yields—

Variety.	Cane per Acre.	*C.C.S. in Cane.
	Tons.	Per Cent.
M. 1900 Seedling	28·3	13·0
P.O.J. 234	30·5	**15.3**
P.O.J. 2878	37·5	11·9
P.O.J. 2725	39·1	13·2
Co. 290	**39.2**	13·5

* Small mill tests.

Co. 290 and P.O.J. 2725 gave almost identical cane yields, while P.O.J. 2878 and P.O.J. 234 also outyielded the standard on what is usually regarded as a "1900 seedling farm." P.O.J. 234 again excelled in c.c.s. content, showing its decided early maturing qualities. As the canes were only eleven months old when harvested, the figures for the remaining canes cannot be regarded as supplying a true index in this respect. With the exception of P.O.J. 2878, however, the c.c.s. values were in each case superior to that from the 1900 seedling.

Mr. J. Young's Farm, Burnett Heads Road, Qunaba.

Soil type, red volcanic loam.

Age of crop, 12½ months.

Crop yields—

Variety.	Cane per Acre.	*C.C.S. in Cane.
	Tons.	Per Cent.
P.O.J. 213	26·7	13·7
P.O.J. 979	26·6	13·8
P.O.J. 234	27·9	**15.0**
Co. 281	30·4	12·4
Co. 290	**37.2**	14·7

* Small mill tests.

This trial was confined to the thinner type canes, and P.O.J. 213 was included as the standard of comparison. Co. 290 was again the highest yielding variety, while P.O.J. 234 laid further claim to early maturity by recording the best c.c.s. value at the time of harvesting. In this trial, however, the c.c.s. of Co. 290 was but slightly inferior, thus suggesting that this variety might be expected to provide a very satisfactory sugar content combined with heavy cane tonnages, if harvested as a mid-season crop.

DISCUSSION OF RESULTS.

The results to date provide good cause for optimism regarding the future of these new varieties, particularly Co. 290 and P.O.J. 2725. All available canes of these varieties have been placed in further propagation plots, and next year they will be distributed in reasonable lots to all desirous growers. In all, some hundreds of tons will be available in the Bundaberg area alone, while supplies are being provided at Childers, Maryborough, Bauple, and Nambour.

The following notes should be of interest to growers in the South:—

P.O.J. 2725.—A cane of good barrel, low in fibre, and carrying the well-known growth vigour of the P.O.J. canes. It is a reputed early-maturer, and has lived up to its representation in Mackay. In the southern districts it has not justified this view to date, but when planted in March, the c.c.s. results will probably be much improved. At Mackay it has proven a high c.c.s. cane. Its resistance to most major diseases stamp it as a cane worthy of attention, though it is highly susceptible to Fiji disease.

Co. 290.—This is easily the best of the Coimbatore canes tested to date. In barrel it approaches D. 1135, and when well grown could be harvested in the leaf. It is a low-fibred cane and in this respect differs from the earlier Co. varieties. Certain plots of this cane have given 50 tons per acre on what are normally moderate yielding farms, and the crops here far outyielded the remaining canes in the trials, with the exception of P.O.J. 2725. It is not suggested that this is a first-class cane, by reason of its rather small barrel, but it is destined to become a very valuable variety by virtue of its high resistance to gumming and drought. It should not be necessary to state that it is not intended for rich river flats where prolific growth might result in lack of maturity. In a trial at Nambour, it has grown particularly well on a very wet block where other varieties have partially failed. Under these conditions a high c.c.s. cannot be expected; this is a normal experience in very wet soils.

P.O.J. 234.—This is a cane of the general P.O.J. 213 class, with respect to its barrel size, and it will be necessary to burn prior to harvesting. This cane possesses the advantage of early maturity, and for this reason is worthy of consideration for frosted fields. It is highly resistant to gumming disease, but quite susceptible to mosaic and should, therefore, not be planted on river flats and other locations where the spread of this disease is rapid.

P.O.J. 2878.—The "Wonder Cane" is already well known to growers in these parts, and is rapidly gaining in popularity. It should be planted in March, for best results. Some excellent standover crops have been harvested in Bundaberg, Childers, and Nambour during the present season. Doubtless the year was most favourable for standover crops.

P.O.J 2875.—This cane shows decided promise, but to date a number of disappointing strikes have been recorded. This matter is being investigated, but in all probability the cane will be satisfactory from this point of view, if young canes be taken for March plantings. The poor strike was responsible in a large measure for the moderate tonnage yield recorded on Messrs. Gahan Brothers' farm.

P.O.J. 979.—This is one of the thinner type P.O.J. canes, and will be kept under observation for a further year before definite recommendation will be made.

Co. 281.—This cane is also of small barrel, and has been retained chiefly on account of its reputed early maturity. This has not been realised in the trials set out during the past season, and further observations will be necessary before it can be recommended for commercial plantings.

Conclusion.

It is evident that the plan adopted by the Bureau some five years ago for the selection of highly disease-resistant canes of good yielding quality has achieved success. It is not claimed that the unusual yields recorded above will be realised in all seasons, for the past year has doubtless been a most favourable one; but it is confidently suggested that certain of the new varieties will greatly outyield the older standards, and pave the way for the complete elimination of the old susceptible canes together with their gumming disease.

By Authority: David Whyte, Government Printer, Brisbane.